

Appl. No. 09/889,090  
Amendment and/or Response  
Reply to Office action of 9 September 2005

Page 2 of 8

**Amendments to the Claims:**

A listing of the entire set of pending claims (including amendments to the claims, if any) is submitted herewith per 37 CFR 1.121. This listing of claims will replace all prior versions, and listings, of claims in the application.

**Listing of Claims:**

1-2. (Canceled)

3. (Currently amended) A liquid crystal displaying apparatus capable of displaying a color image, comprising:

a liquid crystal panel in which each main pixel unit ~~including~~ includes a red sub-pixel, a green sub-pixel, a blue sub-pixel and a luminance-enhancing sub-pixel, and

calculation means for calculating digital output values  $R_o$ ,  $G_o$  and  $B_o$  for driving ~~said the~~ red sub-pixel, ~~said the~~ green sub-pixel and ~~said the~~ blue sub-pixel, respectively, from digital input values  $R_i$ ,  $G_i$  and  $B_i$  respectively for ~~said the~~ red sub-pixel, ~~said the~~ green sub-pixel and ~~said the~~ blue sub-pixel and a predetermined digital value  $W$  for driving ~~said the~~ luminance-enhancing sub-pixel so that a relationship of  $R_i:G_i:B_i = (R_o+W):(G_o+W):(B_o+W)$  is satisfied, ~~said the~~ values  $R_i$ ,  $G_i$  and  $B_i$  being obtained from an input color image,

wherein ~~said the~~ digital value  $W$  is obtained in accordance with a function represented by a formula  $W = f(Y_{max}, Y_{min})$  where  $Y_{max}$  and  $Y_{min}$  are based on both a maximum value and a minimum value, respectively, of said the digital input values for said red sub-pixel, said green sub-pixel and said blue sub-pixel.

4. (Currently amended) A ~~The~~ liquid crystal displaying apparatus according to of claim 3, ~~wherein characterized in that said function represented by said formula  $W = f(Y_{max}, Y_{min})$  is a function which~~ the digital value  $W$  monotonously increases as a value of said  $Y_{max}$  value or said  $Y_{min}$  value the maximum value or the minimum becomes larger.

Appl. No. 09/889,090  
Amendment and/or Response  
Reply to Office action of 9 September 2005

Page 3 of 8

5. (Currently amended) A ~~The~~ liquid crystal displaying apparatus ~~according to of~~ claim 3, ~~wherein characterized in that said formula of W is given by a function in which said Ymin, the minimum value is a variable with said Ymax being and the maximum value is a constant, and in that said function represented by said formula  $W = f(Y_{max}, Y_{min})$  is a function which the digital value W monotonously increases as a value of said Ymin, the minimum value becomes larger.~~

6. (Canceled)

7. (Currently amended) A display device comprising:

a plurality of picture elements,

each picture element including a plurality of color sub-pixels and a white sub-pixel,

a decoder that is configured to receive a plurality of input color values and to produce therefrom a plurality of color luminance pixel values that are used to drive corresponding color sub-pixels, and white pixel values that are used to drive the corresponding white sub-pixels,

wherein

the decoder is configured to:

determine a minimum color luminance value and a maximum color luminance value for each picture element,

produce the color luminance pixel values for each picture element dependent upon the input color values and the maximum color luminance value, and

produce the white pixel value for each picture element based on the minimum color luminance value.

8. (Currently amended) The display device of claim 7, wherein

the decoder is configured to produce the color luminance pixel values for each picture element dependent also upon the white pixel value.

Appl. No. 09/889,090  
Amendment and/or Response  
Reply to Office action of 9 September 2005

Page 4 of 8

9. (Currently amended) The display device of claim 8, wherein  
the decoder is configured to produce the white pixel value for each picture  
element dependent also upon the maximum color luminance value.

10. (Currently amended) The display device of claim 9, wherein  
the white pixel value is  $\leq Y_{min} * Y_{max} / (Y_{max} - Y_{min})$  when  $Y_{min} / Y_{max} \leq 0.5$ ,  
and  
the white pixel value is  $\leq Y_{max}$  when  $Y_{min} / Y_{max} > 0.5$ ,  
where  $Y_{min}$ ,  $Y_{max}$  corresponds to the minimum color luminance value and  
the maximum color luminance value, respectively.

11. (Currently amended) The display device of claim 10, wherein  
each color luminance pixel value corresponds to  $C_i * (W + Y_{min}) / Y_{max} - W$ ,  
where  $C_i$ ,  $W$ ,  $Y_{min}$ , and  $Y_{max}$  correspond to the input color value, the white  
pixel value, the minimum color luminance value and the maximum color luminance  
value, respectively.

12. (Currently amended) The display device of claim 7, wherein  
the decoder is configured to produce the white pixel value for each picture  
element dependent also upon the maximum color luminance value.

13. (Currently amended) The display device of claim 12, wherein  
the white pixel value is  $\leq Y_{min} * Y_{max} / (Y_{max} - Y_{min})$  when  $Y_{min} / Y_{max} \leq 0.5$ ,  
and  
the white pixel value is  $\leq Y_{max}$  when  $Y_{min} / Y_{max} > 0.5$ ,  
where  $Y_{min}$ ,  $Y_{max}$  corresponds to the minimum color luminance value and  
the maximum color luminance value, respectively.

Appl. No. 09/889,090  
Amendment and/or Response  
Reply to Office action of 9 September 2005

Page 5 of 8

14. (Currently amended) The display device of claim 7, wherein

each color luminance pixel value corresponds to  $C_i \cdot (W + Y_{\min}) / Y_{\max} - W$ ,  
where  $C_i$ ,  $W$ ,  $Y_{\min}$ , and  $Y_{\max}$  correspond to the input color value, the white  
pixel value, the minimum color luminance value and the maximum color luminance  
value, respectively.

15. (Currently amended) The display device of claim 7, wherein

the decoder is configured to provide the color luminance pixel values for each  
picture element such that a ratio of the color luminance pixel values to each other  
corresponds to a ratio of the input color values to each other.

16. (Currently amended) A method of determining a set of output luminance values  
for driving sub-pixels of a pixel based on input color values, comprising:

determining a minimum color luminance value and a maximum color  
luminance value based on the input color values,

determining each output color luminance value of the set of output luminance  
values based on the corresponding input color value and the maximum color  
luminance value, and

determining an output white value of the set of output luminance values based  
on the minimum color luminance value.

17. (Currently amended) The method of claim 16, wherein

determining each output color luminance value includes

determining each output color luminance value so that a ratio of each  
output color luminance value to each other corresponds to a ratio of each input color  
value to each other.

Appl. No. 09/889,090  
Amendment and/or Response  
Reply to Office action of 9 September 2005

Page 6 of 8

18. (Currently amended) The method of claim 16, wherein  
determining each output color luminance value is also based on the output  
white value.

19. (Currently amended) The method of claim 16, wherein  
determining the output white value is also based on the maximum color  
luminance value.

20. (Currently amended) The method of claim 16, wherein  
determining each output color luminance value includes  
calculating  $Co = Ci * (W + Ymin) / Ymax - W$ ,  
where Co, Ci, W, Ymin, and Ymax correspond to the output color luminance  
value, input color value, the white pixel value, the minimum color luminance value  
and the maximum color luminance value, respectively.